BENCHTEST

'A multi-user, low-cost minicomputer at microcomputer prices?' Peter Rodwell seizes the long-awaited opportunity to scrutinise the Fortune 32:16.

Something like a year ago, I was invited to a posh London hotel for a sneak preview of the latest in 16-bit microcomputer technology, the Fortune 32:16. I had already heard much about this machine for it had caused a sensation a few months previously when it was unveiled in America: it was based on the Motorola 68000, which at that time had been tamed by very few companies, and it offered, said the reports, minicomputer power at micro prices.

The quick demo in a hotel room looked impressive and I have been itching to get my hands on one every since: there appeared to be a few rough edges on the demo machine but the concepts looked interesting and it promised to give microcomputing a major nudge forward.

Having now seen the machine and spent a considerable amount of time with it, I must say straight away that I'm not so sure. I'm not sure whether what it offers could be called a major nudge forward and, frankly, for reasons which will become apparent, I can't even decide whether or not I like the machine. . .

Hardware

Styling is a matter of personal taste and although I think the Fortune is a rather stylish machine, others I know thought it rather ugly. The machine comes in a now standard 'three-box' configuration — separate screen, keyboard and main box containing the disk drives and electronics. The main box features a horizontal ribbing arrangement across the front and it comes in two-tone beige.

The display gives a standard 24 lines of 80 characters in green on a black background. It sits happily on top of the processor box and can be swivelled and tilted through a useful range of angles. There's only one control for the display — a brightness knob on top, where it's easily accessible. I didn't care much for the characters on the display — they looked a little cramped and only just had proper descenders, not quite the quality one would expect on a system of this price.

Fortune brochures mention graphics and colour but these aren't yet available. A monochrome graphics display should be available towards the end of this year and colour should follow on early next year. One of the nice things about Fortune is that as a matter of policy it releases all new products worldwide simultaneously — it's very annoying with some American companies to see all sorts of new goodies appearing only in the States, with us poor relations having to wait for months before they cross the Atlantic. This policy applies to both software and hardware developments, by the way.

The keyboard has 99 keys, all colour coded according to function. The main qwerty keys are in white, as are the numeric keys. Blue is used for keys like ESCape and RETURN and also for the HELP key, which sits at the top left-hand edge of the keyboard. Grey is used for cursor control and editing, and also for a column of three keys at the left which provide symbols such as '{' and '}', very handy for all the C programmers likely to be using the machine. There's a gap between the row of function keys and the top of the qwerty area in which a plastic strip can be inserted with function key labels and indeed these strips are provided with Fortune's applications packages. The keyboard features two RETURN keys, one with the qwerty block and one with the numeric pad plus an EXECUTE key which will initiate a command or menu selection and which generally — but not always — is synonymous with the RETURN key.

The keyboard has a nice 'professional' feel to it, if a little light to the touch for my taste. All the keys auto repeat if held down for a second or so and this is a two-speed affair: after a couple of dozen or so repeats, the repeat rate speeds up dramatically, which is handy for moving the cursor around quickly in text.

The main box houses all the electronics and the disk drives. An inside look revealed a massive main PCB buried under the disk drives and housing the main electronics: processor, some RAM, boot-up and diagnostics ROM and the floppy disk controller. The CPU is the Motorola 68000, easily spotted because, with 64 pins,

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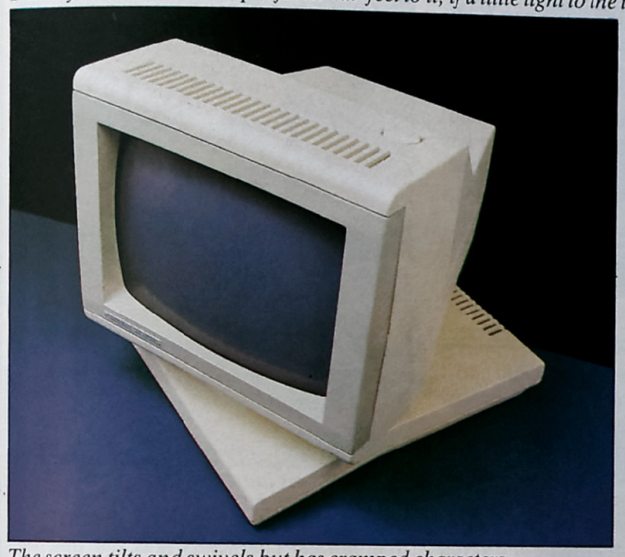


The screen tilts and swivels but has cramped characters

The main box houses all the electronics and the disk drives

it's so big. Although an 8 MHz chip, it's actually clocked at 6 MHz; apparently, because the system is so dependent on the hard disk's data transfer speed, running the CPU in top gear wouldn't actually produce any significant increase in throughput. A faster (in terms of data transfer) hard disk is on the way, though.

The main PCB houses 256 kbytes of RAM, which is what you get with the standard system. A line of four slots towards the rear of the cabinet allows you to plug in extra RAM and in fact the review machine came with ¾ Mbyte slotted in. Each memory expansion board holds 256k, although a 'top-up' board is also available with just 128k on it. As the top-up board costs nearly one-eighth the price of the 256k expansion board, it might at first sight seem worthwhile fitting two of these instead of the 256k board if you don't want the full 1 Mbyte of RAM possible with the machine. Fortune thought of this, though: you can only add the top-up board when you have three 256k boards installed! These boards use 64k RAM chips, of course; interestingly, when 256k RAM chips become available, total memory capacity will be increased to 4 Mbytes as the chips are totally interchangeable.

The review machine came with a 5 Mbyte winchester disk and an 800k floppy. Optionally, a 10 or 20 Mbyte hard disk can be fitted and Fortune also makes a system with two floppies, although with the heavy amount of disk accessing which takes place this would certainly be a painfully slow machine to use and not really a practical proposition in a single-user environment, let alone a multi-user system.

Over on the right hand side of the cabinet are a row of slots for other expansion boards. Two of these were occupied on the review machine, with a hard disk controller and a character generator board. Other options which can be slotted in are a parallel I/O board (the machine comes with only one RS232 port in the way of I/O) and a four-port serial board to drive extra terminals in a multi-user set-up. The bus used is Fortune's own and details are not being released to other manufacturers at the moment, although I'd expect this to change eventually if the machine catches on in a big way — look what's happened with Apple and IBM add-ons.

The minimum useful configuration would be one with the basic 256k of RAM, a 5 Mbyte hard disk and a floppy and this, with a single-user operating system and word processing software, would cost you all of £6000, which makes it a very expensive system indeed if you just want a single-user system, but a reasonable basis for a multi-user configuration — compared to minicomputer prices, it's laughably cheap, of course.

'This is quite definitely not a machine for the corner newsagent . . .'

Systems software

Powering up the 32:16 is a rather lengthy process. Of course it only takes a second to reach round and flick the 'on' switch at the back of the machine but then there's a

FORTUNE 32:16

lengthy wait before you can do anything useful. The machine displays its name and the cryptic message 'Please wait', which flashes as the hard disk churns away busily and the numbers 1 to 9 appear slowly on the screen. A whole minute elapses before the time and date are displayed and you are invited to correct these (they were always wrong). The machine then tells you it's checking your files and there's another delay, of 45 seconds, while it does this before asking for your name and password. You then find yourself in the Global Menu.

Nothing appears on the screen at any stage to tell you so but the machine runs the Unix operating system. On the review machine, as on all standard configuration models, this was supplied for a single-user environment, but an upgrade package converts this for multi-user use. Now regular *PCW* readers will have gathered by now that Unix is not exactly a big favourite of mine. For those of you who have missed my ravings on the subject, here's a brief resume:

Unix was developed by a division of America's gigantic Bell Corporation, the very same one which runs most of the US telephone system. It was developed to provide programmers with a flexible, powerful and easy-to-use 'software development environment'. In other words, it was designed by computer programmers for computer programmers and therefore a number of assumptions were made in its design, principally that the user would be very familiar not only with computers generally but with a number of computing concepts which are far from obvious to the layman.

It was further assumed that should a user be unfamiliar with any of the concepts required to use the system, he or she would happily spend time learning them and that error messages or other remarks displayed by the system could safely be couched in technical terms without the risk of anyone not understanding them. Unix was most certainly not designed as an operating system which could be placed before a computer-naive end user — a small businessman, say — in the expectation that he would happily sit down and use it with no previous computing knowledge — it was never intended as a system for the general public but as a computing professional's operating system.

In its intended role as a tool for the programmer, Unix is superb and those who support its use as such are certainly justified in doing so. As an operating system for microcomputers (which, after all, are intended as machines for the non-expert, the total computer layperson, to use with minimal computing knowledge and instruction) it is awful in the extreme and anyone who builds a Unix-based microcomputer and markets it in that form, expecting the public to snap it up, has got a nasty shock coming.

Fortunately, Unix has a redeeming feature: it's possible to shield the user from its horrors by adding a friendly 'front end' to it and this is exactly what Fortune has wisely done with the 32:16; other manufacturers considering Unix for their micros should take note.

The 99 keys are colour coded according to function


The brightness knob for display control

'An excellent aspect of the system is its on-line, context-sensitive help facility . . .'

The Global Menu is this front end and it transforms the Fortune into a useful microcomputer for the layperson by removing him or her from any contact with Unix at all, although the option to dive into Unix itself is there for programmers and purists to tackle if they so wish (you simply type 'unix' from the global menu and in you go; Control-D returns you to the menu).

One very excellent aspect of the system is its on-line, context-sensitive 'help' facility. It's there right on the keyboard in the form of a key labelled 'Help' and pressing it at any stage usually produces a screenful of explanation as to what you're supposed to be doing. This is very good indeed and something which all computer manufacturers should emulate, although I suppose it's only really practical, at least to the extent to which it is implemented on the Fortune, with a hard disk-based system. There were, however, a few niches in the system for which there were no 'help' facilities and a brief message to this effect would appear instead.

Fortune has gone further than this by providing an operator training selection on the menu, which is a very good idea indeed and provides a useful introduction to the system.

Selecting an item from the menu is simplicity itself. You can either just type the letter and number next to the item required or move the cursor to it; in either case, the choice is activated by typing RETURN. Quite a large selection of items were present on the menu but most were not implemented on the review machine; the active ones are printed in brighter-than-normal characters and the inactive ones in ordinary type; trying to select an item which had not been installed gave an error message to this effect.

As well as providing access to whatever applications programs and languages have been installed on the system, the global menu also includes various system utilities. A lot of these are concerned with directory manipulations of various sorts. Unix has a hierarchical directory structure but fortunately there's no need for the user to get caught up in its intricacies for a lot of this can take place quite transparently. Certain operations, especially moving from one directory to another or copying files from one directory to another do, however, require that the user maintains a good mental image of the system; my feeling is that this is too complicated for the end user to get to grips with (remember, we're talking about a machine being sold in a market which is supposed to be catering for the computer-naive) but to judge from the pathetic hate-mail I get whenever I dare to criticise Unix, this is an aspect not widely appreciated by Unix proponents. On the other hand, when we're talking about systems with integral 10 Mbyte hard disks, *something* is needed to make it easier to find out what's on the disk and until


The floppy drive door

something better comes along we'll have to make do with roots and subdirectories and pathnames, a rather unsatisfactory situation. Curiously, nowhere in the documentation or in the 'help' pages could I find a way to see what was on a floppy disk; Fortune's attitude to floppies seems to be to regard them exclusively as a means of loading in software to the hard disk and backing up files from the winchester. In fact you need to dive into Unix to find out what's on the floppy, which is rather unsatisfactory — you can't rely on people infallibly keeping disk labels up to date.

There is a special utility for loading a Fortune package from floppy disk onto the hard disk and incorporating it into the global menu. But as far as I could establish, this is *only* for use with software supplied by Fortune. I wrote a short C program and, having successfully compiled and tested it, tried to get it onto the menu, to no avail. The system seemed to require more than just the program on the floppy disk and I could find no information as to what was required. It turns out that again you need to get into Unix to do this, where there's a special utility for this purpose; this won't bother most end users, of course, and is something which any competent programmer should have no trouble with.

Switching on the Fortune is not the only lengthy process; switching off also requires patience, for instead of simply reaching around the back and flicking the switch off, you're supposed to run a special program first. Naturally, I only discovered this in the manual after I'd switched the machine off several dozen times using the on/off switch but no damage seemed to result. What the power-down program does, of course, is to make sure any open files are closed neatly rather than left hanging open, with attendant dangers of corruption. This is all very well on a minicomputer with several users bashing away — you really can't just chop off the power when you feel like it without giving everyone the chance to save their work and close their files. It's a bit silly on a single-user microcomputer but Fortune sees most of its sales being of multi-user systems so it makes sense. But I can't help feeling that, although it's nice to have a system check for possible file corruption before powering down, this is really something which could and should be done automatically.

Space doesn't allow me to go into the fully gory details of this Unix implementation — it seems very standard and any Unix programmer should feel perfectly at home. An upgraded version is in the pipeline (pun) and should be available soon; it's said to offer a substantial increase in throughput speed as well as some extra facilities.

Languages

One choice on the global menu is headed simply 'Prog languages'. Only Basic and C were supplied on the test machine, with Fortran and Pascal on the languages menu but unimplemented. Cobol is planned and will be launched soon.

Like most other aspects of the system, Fortune Business Basic has a definite minicomputer air to it; in fact it reminded me strongly of the first Basic I ever came across, on a DEC 2020 system, and has a decidedly antique feel to it compared to most microcomputer Basics (yes, even Microsoft Basic!). For example, it will only accept keywords typed in upper case and it adds leading zeros to line numbers when you LIST a program. But these are relatively trivial points, for it's clearly a Basic designed for programmers rather than end users and is one of the most powerful Basics, in terms of the range of facilities and utilities provided, that I have come across.

One of its most valuable features is that program lines are 'compiled' as soon as they are entered. I put quotes around the word compiled as this is the term used in the manual, but I feel it's more a case of semi-compilation, like that used in Cromemco Basic. The advantage of this is of course that you get an instant error message when you make a syntax error; Fortune Basic displays a curt error message and reprints the offending line with a 'V' over the wrong part, which I think is an approach which should long ago have been incorporated into every Basic — it's far better than typing in your program and discovering all the syntax errors at RUN time.

'We are talking about a machine which will appeal chiefly to fairly large businesses . . .'

A further advantage of the semi-compilation approach is that programs should execute faster than those which are interpreted line by line at RUN time. I had expected spectacular things of this Basic, seeing as it combines semi-compilation with the very powerful 68000 processor — a new leader in our Benchmark summary table was indicated. In fact, as the Benchmark timings show, it turned out to be pretty average on the whole, with the added disappointment that I could not get Benchmark 8 to run at all. This includes the user of the LOG() function and although this is documented in the Basic manual, and although I entered it in exactly the format stated in the manual (and several others), the machine kept rejecting it with a syntax error message even though it happily accepted the SIN() which comes in the program's next line.

The Basic is, er, basically quite standard but has a large number of extensions and utilities; of particular interest is the provision for file locking and unlocking. This is important in a multi-user system — you don't want other people messing about in your files while you're using them so you can lock them out until you've finished updating it.

The 32:16 is the first machine we've Benchtested to come complete with a C compiler. It's not included in the price of the machine (and neither is the Basic or any other language) but as C is the language of Unix (Unix is nearly all written in C and C was originally developed on — but is by no means limited to — Unix systems) most programmers will want this option with their Fortunes.

The Fortune C compiler is a complete implementation of the languages as defined in the standard work on the subject, Kernighan and Ritchie's *The C Programming Language*. Its functions library contains much, much more than just the standard functions, however, and should prove a real boon to Fortunate programmers.

Time didn't allow me to investigate all of the functions available — or even a useful number of them — but I tried typing in a few C programs and immediately hit a silly snag. Fortune supplies an excellent word processor, For:Word (see below) and naturally I wanted to use this to type in my programs. Unfortunately (another pun) For:Word inserts characters which the C compiler rejects and it's necessary to use the Unix line editor instead. This is slightly better than CP/M's Ed, but only just, and I'm constantly amazed that such products are still offered — surely programmers deserve decent word processors, too.

Although the C compiler appears on the languages menu accessible from the global menu, you have to get into Unix itself to use it, which is no deterrent to a programmer, of course, and emphasises in a small way the difference between C and Basic (the latter being completely accessible from the global menu level) — C is a tool mainly for the professional programmer while Basic is more suitable for the occasional hacker as well.

We haven't yet managed to write a suite of C Benchmark programs (it's in hand) so I can't provide accurate comparisons. It's no surprise, though, that C programs executed very, very quickly on this machine. They were, after all, fully compiled and C makes optimum use of Unix as it was designed for this operating system in the first place.

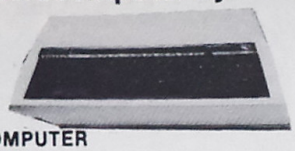
Applications software

Two applications packages came with the review machine: the For:Word processor and Microsoft's Multiplan spreadsheet. As the latter has already been Benchtested in *PCW* I won't go too much into it other than to say that it seemed to run significantly faster than the Sirius version with which I am familiar, but this is only to be expected with that 68000 doing the hard work.

For:Word bears an uncanny resemblance to the Wang Writer software, generally reckoned to be one of the best dedicated word processors around. The resemblance isn't just software deep, either: the keyboard also has a Wang look to it . . .

To do it justice, For:Word will have to be

BBC Microcomputer System



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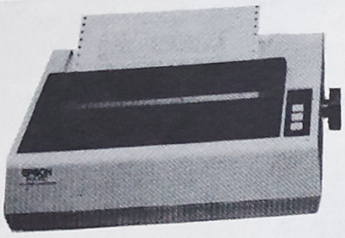

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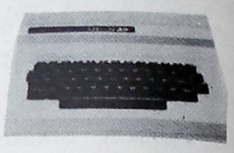

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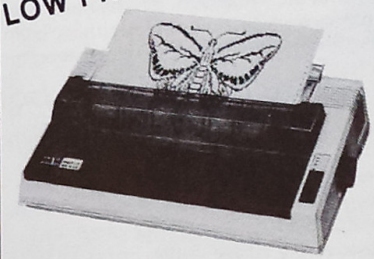

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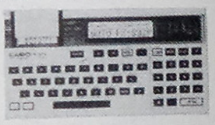

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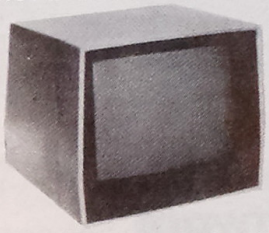

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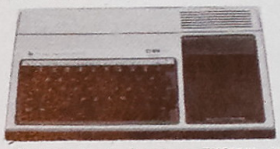

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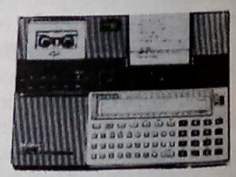

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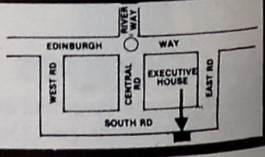

subjected to a *PCW* Word Processor Benchtest in due course because it's a complex package although very easy to use. Again, the use of a plastic strip of function key labels makes it very easy to operate indeed and while it doesn't have some of the very esoteric functions offered by some microcomputer WP packages, it has everything (including a glossary function!) which normal commercial WP users could require. I am, in any case, beginning to feel that some micro WP packages are becoming *too* complex — although some users may need to be able to do anything conceivable to a piece of text, I think the bells and whistles available with some packages actually start to hinder the user with relatively simple WP needs — and that type of user makes up a very hefty proportion of WPers.

For:Word strikes a useful balance between simplicity of use and flexibility of functionality (did I really write that?). I mean that it provides a wide range of general WP functions without going over the top and giving you *everything*. This balance means you can sit right down and use it with only a glance at the manual and an occasional stab at the HELP key and do something useful, not a situation which applies to some of the bigger WP packages around. My only whinge from an admittedly less than comprehensive play with it concerns the display: extra symbols are inserted on the screen to show where you've hit RETURN or TAB and this makes your text look rather messy, but it's something I could learn to live with.

Other applications packages are planned, including a full accounting suite from Tetra (Fortune's US accounting software is of course useless in this country because of differing accountancy practices). And the forthcoming availability of Cobol means that a hefty amount of minicomputer software will be available very easily and quickly, which is good news for the corporate buyers who have minis already and want smaller machines on which they can use their existing software.

Documentation

Unlike too many other manufacturers, Fortune has taken a lot of trouble over its documentation. With the machine came a whole series of manuals, most of which were thick, A5 sized loose-leaf affairs with proper indices and illustrations even.

A manual comes with each applications package and language, although in the case of the C compiler the manual was A4 sized and not nearly as well presented as the others. A Unix programmer's manual was also supplied: it was A4 sized and 35mm thick and most definitely *not* for anyone unfamiliar with Unix!

The For:Word manual was clearly a preliminary version for too many pages contained simply a stark 'Text is being written and will be available soon'. It did however fulfil the basic requirements of documentation aimed at the end user: it was clear and concise, couched in non-technical terms without being patronising, explained *everything* in both tutorial and reference sections and made sensible use of diagrams and illustrations to make points absolutely clear, with the odd cartoon thrown in for good measure.

The Business Basic manual was more serious but no less useful and clearly aimed at a slightly different user, one familiar with computers and programming (there's no tutorial section) and, apart from the LOG mystery noted in the 'Languages' section above, seemed OK.

A thinner manual, called *Understanding Your Fortune System*, took me by surprise after the pleasant impression received from the other manuals. It's just as well-written, laid out and printed as the rest but it does really show up the 32:16 in its true light.

This manual is for the system manager, the person given responsibility for running and looking after the computer and is full of advice on keeping logbooks, installing products, adding new users to the system and making back-up copies of files and directories. I don't mean to imply any criticism here, it's just that at last we find out what the Fortune really is — it's a minicomputer, and this manual makes it clear that users had better get out of the sloppy habits adopted by us micro users and start treating the thing with the respect it deserves. But full marks to Fortune for the quality of its documentation — we need to see more like this in the mini, sorry, micro world.

Conclusions

When I first sat down with the machine, it was with the attitude that this was primarily a single-user microcomputer. What we have in fact is a multi-user, low-cost minicomputer at microcomputer prices. Fortune, too, regards it in this light, not only by supplying it with a minicomputer operating system but by supplying exclusively minicomputer software, a practice which it intends to continue.

We are therefore talking about a machine which will appeal chiefly to fairly large businesses, those which already have minis or mainframes and now want low-cost desk-top computing power as well but which aren't satisfied with conventional microcomputers.

Currently, the 32:16 will communicate with any Unix machine and the hardware and software to enable it to communicate with other types of mainframes and minis is on the way. Big computer users are used to thinking in terms of megabucks so while the Fortune is outrageously expensive in comparison to other single-user micros, it's bargain-basement stuff to these big users and should therefore appeal strongly. An office within a large company can be equipped with its own computer, to which several people can have access through their own terminals, and which can be linked into the company's main computing resources very easily and effectively, at remarkably little cost. This is quite definitely *not* a machine for the corner newsagent — it's not marketed as such, it's

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Benchmark timings

BM1	2.4
BM2	5.8
BM3	10.5
BM4	9.6
BM5	13.4
BM6	25.7
BM7	37.6
BM8	(see text)

All timings in seconds. For an explanation of the Benchmark programs, see PCW Vol 5 No 11, November 1982.

Prices

Hardware

Single-user start-up system: 256k RAM, 5 Mbyte hard disk, 800 kbyte floppy, single user operating system and For:Word	£5,995
As above but with 10 Mbyte hard disk and *without* For:Word	£8,404
As above but with 20 Mbyte hard disk	£9,245
Multi-user operating system upgrade	£418
Comms board (required for multi-user system with three to five users)	£418
Work station (intelligent terminal for extra users)	£921
256k memory expansion board	£1,259
128k memory 'top-up' board	£165

Software

Business Basic	£247
Cobol compiler*	£669
Cobol run-time package*	£418
Fortran compiler	£418
Pascal compiler	£418
C compiler	£418
Idol database	£500
For:Word (included in basic system)	£418
Multiplan	£247

Business accountancy — various modules ranging from £275 to £544.

*Cobol available shortly

Technical specifications

CPU	Motorola 68000, 6 MHz
RAM	256k, expandable to 1 Mbyte
ROM	4k bootstrap
Display	24 lines of 80 characters, monochrome
Keyboard	99 keys including 16 function keys, full cursor control, numeric pad
Disks	5, 10 or 20 Mbyte winchester hard disk; 1 800 kbyte 5¼in floppy
I/O	1 RS232 serial port; additional serial and parallel ports optional
System software	Unix with user-friendly menu front end
Languages	Optional Basic, C, Pascal, Fortran, Cobol
Applications	Word processing, spreadsheet, database, business accounts.